

REMARKS AND ARGUMENTS

1. Status of the Application

Claims 30-37 and 44-75 are pending in the application. In a Response to Restriction date November 21, 2000, Applicant elected to prosecute Species I, including claims 30-37, 44, 47-68, 70-72, 74 and 75. The Examiner disagreed with Applicant's election of claims 45, 47, 55-56, 63, 65-66 and 68 stating that they are drawn to Species IV, Figs. 6-7. Without admitting the propriety of the Examiner's characterization of these claims, Applicant agrees to their withdrawal. Additionally, Applicant requests that claims 57-60, which ultimately depend from independent withdrawn claim 55, be also withdrawn, as discussed in a telephone communication between Examiner Chang and Applicant's attorney Maria Comninou on March 7, 2001. Applicant reserves the right to prosecute all the withdrawn claims at a later time. Accordingly, Applicant is not addressing the Examiner's rejections of claims 57-60. Claims 30-37, 44, 48-51, 61, 62, 64, 67, 70-72, 74 and 75 stand rejected.

2. Specification and Claim Objections

The informalities in the specification and claim 72 have been corrected and Applicant respectfully requests reconsideration and removal of the objections to the specification and claims.

3. Claim Rejections- 35 USC §112

Claims 32, 53, 54 and 62 are rejected under 35 USC §112, second paragraph. The rejections of claims 57-60 are not addressed at this time, because these claims are withdrawn.

The Examiner stated that claim 32 lacks sufficient antecedent basis for "said track". Claim 32 depends from claim 31, which recites "a continuous serial track component feed source". Applicant has amended claim 31 to recite as "a component feed source having a continuous serial track".

In connection with claims 53 and 54, the Examiner stated that the use of the single word "alignment" to refer to originally recited terms "detected component alignment" and "predetermined component alignment" is ambiguous in claims 53 and 54. The Examiner also

stated the combination of the preamble "apparatus" with the portions "component" and "fiducial marker" in the body of the claims makes the scope of these claims vague and indefinite as to whether they include a component and a fiducial marker. Applicant has amended claim 53 to place it in independent form and has amended to claims 53 and 54 to correct any antecedent problems in connection with the word "alignment".

The Examiner stated that the word "operator" renders claim 62 vague and indefinite. Applicant has amended claim 62 to remove the word "operator".

Applicant respectfully requests that the Examiner reconsider and withdraw the rejections under 35 USC §112, second paragraph.

4. Claim Rejections- 35 USC §103(a)

Claims 30-32, 34-37, 44, 48-51, 61, 64, 67, and 74-75 were rejected under 35 USC §103(a) as being unpatentable over U.S. Patent No. 5,040,291 to Janisiewicz et al. ("Janisiewicz") in view of U.S. Patent No. 5,787,577 to Kent ("Kent"). Claims 33 and 70-72 were rejected under 35 USC §103(a) as being unpatentable over Janisiewicz in view of Kent and in further view of U.S. Patent No. 4,914,809 to Fukai et al. ("Fukai").

Claims 70 and 71 have been cancelled and claim 72 has been placed in independent form. Claim 53 has also been placed in independent form as discussed above.

As will be discussed in further detail below, the subject matter of independent claims 30, 44, 61, 64, 53, 72 and 74 are believed to be patentable over the above-cited references. It also follows that all of the claims that depend from these independent claims are also patentable over the asserted combination of references. Accordingly, Applicant is not separately addressing each asserted rejection of each dependent claim, but expressly reserves the right to do so in the future if necessary.

Applicant's specification (page 2, line 2 to page 3 line 6) discloses that electrical components must be properly aligned even though they appear symmetric because they may be 180° out of alignment, in the case of rectangular components with symmetric leads on both sides, such as that rectangular component shown in Figure 1(a), or 90° out of alignment in case of

square components with symmetric leads on all sides as shown in Fig. 2(a). Although the components **appear to be** symmetric (because of their packaging), they do not function properly in all positions of this apparent symmetry, except in exceptional cases (page 2, lines 32-34). The components function properly only when connected in a **predetermined lead alignment**. For this reason, one embodiment of Applicant's invention includes placing a physical or superficial **fiducial marker** on the component that distinguishes the alignment of the leads on the component (i.e. a "**fiducial alignment**"). The fiducial alignment of the fiducial marker on the component that can be **detected** and compared with a **predetermined fiducial alignment** that is indicative of a **predetermined lead alignment** (p. 3, lines 19 – 31, p. 5, lines 17 – 29). The specification also distinguishes between the **predetermined lead alignment** of the component and the **fiducial alignment**, which is created by providing the **fiducial marker** (p. 3, lines 23-28) on the component. Applicant has amended independent claims 30, 44, 61, 64 and 75 to correct antecedent problems in connection with the word "alignment" identified by the Examiner and has made other editorial changes in these claims.

Each of the amended independent claims 30, 44, 53, 61, 64, 72 includes a fiducial alignment detector and controller with instructions, which, when executed by the controller, cause the controller to compare a detected fiducial alignment with a predetermined fiducial alignment that is indicative of a predetermined lead alignment. Claim 74 is written in means plus function form and recites means for detecting a fiducial alignment and means for comparing the detected fiducial alignment with a predetermined fiducial alignment that is indicative of a predetermined lead alignment. Such fiducial alignment detector and corresponding controller (or means for detecting and means for comparing) are not disclosed by either Janisiewicz or Kent or Fukai. The Examiner states that Kent discloses such a detector and controller. Kent discloses a method in which a vision section captures an image of an electronic part, compares it to an electronic template within a given tolerance window and accepts the part if there is no overlap. Then it calculates at least one dimension of the accepted part and adjusts the electronic template. The purpose of this method is to have a dynamic adjustment of the electronic template to avoid excessive part rejection of parts with mechanical differences. Using Kent's apparatus and method, a perfectly symmetric part with perfect dimensions will be accepted for placement, and yet it could be placed 180° out of lead alignment if the part has leads contained in its package. Furthermore, a component with a physical fiducial marker that exceeds the boundary of the

template would be rejected by the apparatus of Kent, even though perfectly aligned for lead connection. The embodiments of Applicant's claimed invention solve this and other problems by detecting a fiducial marker that has been placed on a component and comparing the detected fiducial alignment with a predetermined fiducial alignment that is indicative of a predetermined lead alignment. Therefore, the independent claims 30, 44, 61, 64, 53, 72 and 74 are patentable over the cited prior art and, at least for this reason, the claims that depend from them are also patentable.

Claims 33 and 72 were rejected under 35 USC §103(a) as being unpatentable over Janisiewicz in view of Kent and in further view of Fukai. As discussed above, these references do not disclose, either singly or in combination, a fiducial alignment detector and corresponding controller as cited in claims 33 and 72, and therefore are also patentable.

5. Conclusion

Applicant has fully addressed the matters raised in the Office Action. Applicant submits that all of the pending claims are in condition for allowance. Accordingly, reconsideration and passage to allowance of the subject application at an early date are earnestly solicited.

If the Examiner has any concerns regarding the application and its claims, Applicant respectfully requests that the Examiner contact the undersigned so that those concerns may be addressed expeditiously.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the specification

Paragraph beginning at line 7 of page 12 in the specification has been amended as follows:

One skilled in the art will appreciate the receiver 24 can be arranged in a stationary position relative to the feed source 144 or the receiver 24 can be coupled with the movement of the pick head 136 [36]. Also, a plurality of receivers 24 can be used that correspond to one or more of a plurality of pick heads. In addition, components 2 can also be fed to the pick stations using parallel feed sources, which also may be either continuous or discontinuous.

In the claims

Claims 70 and 71 have been cancelled.

Claims 30, 31, 32, 44, 48, 53, 54, 61, 62, 64, 72, 74 and 75 have been amended as follows:

30. (Twice Amended) A component transfer apparatus for transferring at least one component having leads, said apparatus comprising:

a pick and place machine including a controller connected to a movable pick head and a component feed source, said pick head having access to said component feed source; and

a [component] fiducial alignment detector comprising a receiver directed toward said feed source and connected to said controller, wherein said controller contains instructions which, when executed by said controller, cause said controller to compare a detected [component] fiducial alignment with a [known component] predetermined fiducial alignment that is indicative of a predetermined lead alignment.

31. (Amended) The apparatus of claim 30, wherein said component feed source comprises a [continuous serial track] component feed source having a continuous serial track.

32. (Amended) The apparatus of claim 31, wherein said [continuous serial track] component feed source further comprises a plurality of component trays serially disposed along said continuous serial track.

44. (Amended) A component transfer apparatus for a component having leads, said apparatus comprising:

a pick and place machine having a component feed source and a movable pick head having access to said component feed source;

a [component] fiducial alignment detector directed toward said component feed source; and

a controller coupled to said fiducial [component] alignment detector and containing instructions which, when executed by said controller, cause said controller to compare a detected [component] fiducial alignment with a predetermined [component] fiducial alignment that is indicative of a predetermined lead alignment.

48. (Amended) The component transfer apparatus of claim 44, wherein said controller contains instructions which, when executed, cause said controller to affect a control scheme in response to said [component] fiducial alignment comparison.

53. (Amended) [The] A component transfer apparatus [of claim 44] for a component having leads and a fiducial marker thereon that is indicative of an alignment of the leads, said apparatus comprising:

a pick and place machine having a component feed source and a movable pick head having access to said component feed source;

a fiducial alignment detector directed toward said component feed source; and

a controller coupled to said detector and containing instructions which, when executed by said controller, cause said controller to compare a detected alignment of the fiducial marker with a predetermined fiducial alignment which corresponds to a predetermined lead alignment.

[wherein the component includes leads having an alignment and a fiducial marker having an alignment that corresponds to said lead alignment.]

54. (Amended) The component transfer apparatus of claim 44, wherein the component includes [leads having an alignment and] at least two fiducial markers each having an alignment that [corresponds to said] is indicative of the predetermined lead alignment.

61. (Amended) A component transfer apparatus for a component having leads, said apparatus comprising:

a pick and place machine having a component feed source and a movable pick head having access to said component feed source;

a [component] fiducial alignment detector directed toward said component feed source and having an alignment signal output; and

a controller coupled to said [component alignment] detector alignment signal output and containing instructions which, when executed by said controller, cause said controller to compare a detected [component] fiducial alignment with a [known] predetermined fiducial [component] alignment that is indicative of a predetermined lead alignment.

62. (Amended) The component transfer apparatus of claim 61, wherein said alignment signal output is a warning prompt[s an operator].

64. (Amended) A component transfer apparatus for a component having leads, said apparatus comprising:

a pick and place machine having a component feed source and a movable pick head having access to said component feed source;

a [component] fiducial alignment detector directed toward said component feed source; and

a controller coupled to said [component alignment] detector and containing instructions which, when executed by said controller, cause said controller to compare a detected [component] fiducial alignment with a [known] predetermined fiducial [component] alignment that is indicative of a predetermined lead alignment, and cause said movable pick head to pick a component from said component feed source.

72. (Amended) A component transfer apparatus [of claim 71] for a component having leads, said apparatus comprising:

a pick and place machine having a component feed source and a moveable pick

head, wherein said component feed source includes at least one nest that defines an asymmetric recess and said moveable pick head has access to said component feed source;

a fiducial alignment detector directed toward said feed source;

a controller containing instructions which, [wherein] when executed by said controller, cause said controller to compare a detected fiducial alignment with a predetermined fiducial alignment that is indicative of a predetermined lead alignment and [said controller instructions] cause said controller to advance said component feed source.

74. (Amended) A component transfer apparatus for a component having leads, said apparatus comprising:

component conveying means;

means for detecting [the] a fiducial alignment [of a component] adjacent said component conveying means; and

means for comparing the detected fiducial alignment with a predetermined fiducial alignment that is indicative of a predetermined lead alignment.

75. (Amended) The apparatus of claim 74, further comprising signal means indicative of whether the detected fiducial alignment corresponds to the predetermined fiducial alignment.